April 11, 1995

EST 1127

Mr. Jody Hill
NUPLA Plastic Corporation
11912 Sheldon Street
Sun Valley, California 91754-2156

Subject: Monitoring of Nested Soil Gas Probes (Third Episode)
NUPLA Plastic Corporation Site
11912 Sheldon Street, Sun Valley, California
(LARWQCB File No. 111.0788)

Dear Mr. Hill:

On March 30, 1995, Environmental Support Technologies, Inc. (EST) monitored two (2) existing multi-depth nested soil gas probe installations at the NUPLA Plastic Corporation site located at 11912 Sheldon Street in Sun Valley, California. Each nested probe installation contained probes at 10, 20, 30, 40, and 50 feet below grade.

Field analyses results for soil gas samples collected from the nested probe installations are summarized in Table 1. Factors affecting the gas-phase distribution of volatile organic compounds in the subsurface are listed in Appendix A. Field analyses results for soil gas samples, quality assurance/quality control data, and three point calibration data are provided in Appendix B.

Soil gas samples were analyzed using a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and an electrolytic conductivity detector (ELCD) placed in series. The GC configuration used a megabore capillary column to allow resolution and quantitation of EPA Method 8010/8020 compounds, including halogenated and aromatic hydrocarbons. Soil gas sampling and analyses were performed in accordance with Los Angeles Regional Water Quality Control Board (LARWQCB) protocols dated March 8, 1994. Details of EST's standard methods and procedures are provided in Appendix C.

23011 Moulton Parkway • Suite E-6 • Laguna Hills, California 92653 • 714/457-9664 • Fax 714/457-0664

Should you have any questions or comments please contact me at (714) 457-9664.

Sincerely,

Environmental Support Technologies, Inc.

Kirk A. Thomson

Kirk A. Thomson, R.G., R.E.A.
Project Manager/Principal Hydrogeologist

cc: EST File

LIMITATIONS AND WARRANTIES

This Report on Monitoring of Nested Probes (Second Episode) has been prepared for the exclusive use of NUPLA Corporation and assigned interested parties. The report has been prepared in accordance with generally accepted environmental assessment practices. No other warranty, expressed or implied, is made.

The information provided in this report is based on measurements performed in specific areas during a specific limited period of time. In the event that any changes occur in waste management practices, site conditions, or uses of the property, the conclusions and recommendations contained in this Soil Gas Survey Report should be reviewed and modified or verified in writing by Environmental Support Technologies, Inc.

Soil gas sample analyses are conducted using laboratory-grade gas chromatography equipment. Chemical compound identification is performed using quantitative methods. Chemical compound identities should be verified using gas chromatography/mass spectrometric analyses methods. Soil gas survey data should be used in conjunction with other site specific data.

There is no investigation which is thorough enough to absolutely exclude the presence of hazardous material at the project site. Therefore, if none are identified as part of a limited investigation, such a conclusion should not be construed as a guaranteed absence of such materials, but merely the results of an investigation. EST, despite the use of reasonable care and a commitment to professional excellence, may not identify the presence of hazardous materials and hazardous compound concentrations in soil, soil gas, and/or groundwater. EST assumes no responsibility for conditions not investigated or for conditions not generally recognized as environmentally unacceptable, at the time of the investigation.

Kirk A. Thomson, R.G., R.E.A.
Project Manager

David M. Pride
Senior Environmental Chemist

TABLE 1

SUMMARY OF FIELD ANALYSES RESULTS FOR SOIL GAS SAMPLES
FROM NESTED PROBE INSTALLATIONS NP1 AND NP2
(THIRD EPISODE MONITORING)

NUPLA PLASTIC CORPORATION
11912 SHELDON STREET, SUN VALLEY, CALIFORNIA
(concentrations are reported in micrograms per liter (ug/L))

4/11/95
FILE: 127ANPT3.WK3

PROBE NUMBER	DEPTH (feet)	SAMPLING EVENTS (3/30/95)	Date(s) Sampled	FREON 113 (ug/L)	TCE (ug/L)	1,1,1-TCA (ug/L)	1,1-DCE (ug/L)	C-1,2-DCE (ug/L)
NP1-10	10	1	03/22/94	ND<1	4	ND<1	ND<1	ND<1
		1	09/20/94	ND<1	ND<1	ND<1	ND<1	ND<1
		1	03/30/95	ND<1	2	ND<1	ND<1	ND<1
NP1-20	20	1	03/22/94	ND<1	22	2	1	ND<1
		1	09/20/94	ND<1	7	1	ND<1	ND<1
		1	03/30/95	ND<1	3	ND<1	ND<1	ND<1
NP1-30	30	1	03/22/94	ND<1	48	4	3	ND<1
		1	09/20/94	ND<1	17	2	ND<1	ND<1
		1	03/30/95	ND<1	18	2	ND<1	ND<1
NP1-40	40	1	03/22/94	ND<1	53	4	4	ND<1
		2	09/20/94	ND<1	24	2	ND<1	ND<1
		1	03/30/95	ND<1	8	ND<1	ND<1	ND<1
NP1-50	50	3	03/22/94	ND<1	55	3	3	ND<1
		1	09/20/94	ND<1	18	3	ND<1	ND<1
		1	03/30/95	ND<1	15	2	ND<1	ND<1
NP2-10	10	1	03/22/94	222	93	2	ND<1	ND<1
		1	09/20/94	ND<1	25	2	ND<1	1
		2	03/30/95	1	113	7	ND<1	2
NP2-20	20	1	03/22/94	ND<1	49	5	3	1
		2	09/20/94	ND<1	37	6	ND<1	4
		2	03/30/95	7	285	19	ND<5	ND<5
NP2-30	30	1	03/22/94	ND<1	124	9	8	2
		4	09/20/94	ND<1	51	8	ND<1	5
		2	03/30/95	ND<5	224	14	ND<5	ND<5
NP2-40	40	1	03/22/94	ND<1	190	11	9	3
		1	09/20/94	ND<1	34	6	ND<1	3
		2	03/30/95	12	351	24	ND<5	ND<5
NP2-50	50	1	03/22/94	ND<1	177	12	9	2
		2	09/20/94	ND<1	52	6	ND<1	3
		2	03/30/95	ND<5	182	11	ND<5	ND<5

FREON 113 = 1,1,2-trichloro-trifluoroethane
TCE = trichloroethene
ND = not detected
1,1-DCE = 1,1-dichloroethene
C-1,2-DCE = cis-1,2-dichloroethene
1,1,1-TCA = 1,1,1-trichloroethane

APPENDICES

Appendix A

FACTORS AFFECTING THE GAS-PHASE DISTRIBUTION OF VOCs IN THE SUBSURFACE

Soil and groundwater contamination by volatile organic compounds (VOCs) can often be detected by analyzing trace gases in soil just below ground surface. This technique is possible because many VOCs will volatilize and move by molecular diffusion away from source areas toward regions of lower concentrations. A gas phase concentration gradient from the source to adjacent areas is established.

The following factors affect the transport and gas phase distribution of VOCs in the subsurface.

1. The liquid-gas partitioning coefficient of the compounds of interest (the "volatility" of the compound).

2. The vapor diffusivity, which is a measure of how quickly an individual compound "spreads out" within a volume of gas.

3. Retardation of the individual compounds as they migrate in the soil gas. Retardation may be due to degradation, adsorption on the soil matrix, tortuosity of the soil profile, or entrapment in unconnected pores.

4. The presence of impeding layers, wetting fronts of freshwater, or perched water tables, between the regional water table and ground surface.

5. The presence of soil moisture around man-made structures such as clarifiers and sumps may suppress volatilization and diffusion of VOCs resulting in false negative or low soil gas concentrations.

6. The presence of contaminants from localized spills or in the ambient air.

7. Movement of soil gas in response to barometric pressure changes.

8. The preferential migration of gas through zones of greater permeability (e.g. natural lithologic variation or back-fill of underground utilities).

At most sites, many of these factors are unknown or poorly understood. Because of this uncertainty, soil gas sampling should be used in conjunction with other site-specific data.

Appendix B

FIELD ANALYSES RESULTS FOR HALOGENATED AND AROMATIC HYDROCARBONS

(INCLUDING CALIBRATION REPORTS, QUALITY CONTROL REPORTS, AND EXPLANATION OF METHOD DETECTION LIMITS)

TABLE B-1
HALOGENATED AND AROMATIC HYDROCARBONS
FIELD ANALYSES RESULTS FOR SOIL GAS SAMPLES
NUPLA PLASTIC CORPORATION, 11912 SHELDON STREET, SUN VALLEY, CALIFORNIA
25-TARGET COMPOUND LIST

PID/ELCD #1 - 3/30/95
FILE: 127BSGRP.WK3

SAMPLE ID			NP1-10	NP1-20	NP1-30	NP1-40	NP1-50	NP2-10	NP2-10	NP2-20
DATE			3/30/95	3/30/95	3/30/95	3/30/95	3/30/95	3/30/95	3/30/95	3/30/95
TIME			12:39	12:56	13:09	13:24	13:38	13:56	14:09	14:22
INJECTION VOLUME (ul)			500	500	500	500	500	500	100	100
PURGE VOLUME (ml)			200	300	400	600	700	200	200	300
VACUUM (in. Hg)			ND	ND	ND	ND	ND	ND	ND	ND
DILUTION FACTOR			1.0	1.0	1.0	1.0	1.0	1.0	5.0	5.0
COMMENTS	RT	ARF								
Dichlorodifluromethane	2:85	2.76E+08	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Vinyl chloride	3:19	6.79E+08	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Chloroethane	3:51	1.22E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Trichlorofluoromethane	3:71	1.51E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
1,1,2-Trichloro-trifluoroethane	4:33	1.62E+09	0.00E+00 ND<1	3.88E+05 ND<1	4.70E+05 ND<1	2.41E+05 ND<1	4.52E+05 ND<1	8.42E+05 1	1.77E+05 ND<5	1.12E+06 7
1,1-Dichloroethene	4:31	3.53E+07	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Methylene chloride	4:83	1.16E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
trans-1,2-Dichloroethene	5:12	1.02E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
1,1-Dichloroethane	5:58	9.75E+08	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
cis-1,2-Dichloroethene	6:17	1.19E+09	0.00E+00 ND<1	0.00E+00 ND<1	0.00E+00 ND<1	0.00E+00 ND<1	0.00E+00 ND<1	1.31E+06 2	3.04E+05 ND<5	4.95E+05 ND<5
Chloroform	6:51	1.33E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
1,1,1-Trichloroethane	6:77	1.23E+09	2.23E+05 ND<1	4.85E+05 ND<1	1.03E+06 2	5.84E+05 ND<1	1.12E+06 2	3.40E+06 6	8.68E+05 7	2.32E+06 19
Carbon tetrachloride	6:97	1.47E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Benzene	7:17	9.26E+07	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
1,2-Dichloroethane	7:20	1.13E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Trichloroethene	7:96	1.23E+09	1.14E+06 2	1.93E+06 3	1.09E+07 16	4.91E+06 8	9.17E+06 15	5.67E+07 92	1.39E+07 113	3.50E+07 265
Toluene	9:63	9.69E+07	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
1,1,2-Trichlorethane	10:19	1.14E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Tetrachloroethene	10:45	1.27E+09	0.00E+00 ND	2.61E+05 ND<1	1.62E+05 ND<1	0.00E+00 ND	2.02E+05 ND<1	6.12E+05 ND<1	0.00E+00 ND	1.80E+05 ND<5
1,1,1,2-Tetrachloroethane	11:78	1.21E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Ethylbenzene	11:79	9.32E+07	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
meta and para-Xylene	11:95	2.44E+08	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
ortho-Xylene	12:56	9.47E+07	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
1,1,2,2-Tetrachloroethane	13:53	1.11E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND

ND = not detected; analyte is below the reportable limit of quantitation for this sample
RT = retention time
ul = microliter
in. Hg = inches of mercury

Concentrations reported in micrograms per liter (ug/L)
ARF = average response factor
ml = milliliter

3/30/95

ANALYST : Ragi Abraham

REVIEWED BY : David M. Pride

TABLE B-1
HALOGENATED AND AROMATIC HYDROCARBONS
FIELD ANALYSES RESULTS FOR SOIL GAS SAMPLES
NUPLA PLASTIC CORPORATION, 11912 SHELDON STREET, SUN VALLEY, CALIFORNIA
25-TARGET COMPOUND LIST

PID/ELCD #1 - 3/30/95
FILE: 127BSGRP.WK3

SAMPLE ID			NP2-20	NP2-30	NP2-30	NP2-40	NP2-40	NP2-50	NP2-50	NA
DATE			3/30/95	3/30/95	3/30/95	3/30/95	3/30/95	3/30/95	3/30/95	NA
TIME			14:34	14:46	14:58	15:10	15:23	15:35	15:51	NA
INJECTION VOLUME (ul)			20	25	100	100	20	100	50	NA
PURGE VOLUME (ml)			300	400	400	600	600	700	700	NA
VACUUM (in. Hg)			ND	ND	ND	ND	ND	ND	ND	NA
DILUTION FACTOR			25.0	20.0	5.0	5.0	25.0	5.0	10.0	NA
COMPOUNDS	RT	ARF								
Dichlorodifluoromethane	2:85	2.78E+08	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Vinyl chloride	3:19	6.79E+08	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Chloroethane	3:51	1.22E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Trichlorofluoromethane	3:71	1.51E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
1,1,2-Trichloro-trifluoroethane	4:33	1.62E+09	0.00E+00 ND<25	0.00E+00 ND<20	5.47E+05 ND<5	1.92E+06 12	2.61E+05 ND<25	3.55E+05 ND<5	2.63E+05 ND<10	0.00E+00 ND
1,1-Dichloroethene	4:31	3.53E+07	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Methylene chloride	4:83	1.18E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
trans-1,2-Dichloroethene	5:12	1.02E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
1,1-Dichloroethane	5:56	9.75E+08	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
cis-1,2-Dichloroethene	6:17	1.19E+09	0.00E+00 ND<25	0.00E+00 ND<20	4.60E+05 ND<5	5.25E+05 ND<5	0.00E+00 ND<25	3.72E+05 ND<5	2.18E+05 ND<10	0.00E+00 ND
Chloroform	6:51	1.33E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
1,1,1-Trichloroethane	6:77	1.23E+09	2.55E+05 ND<25	2.10E+05 ND<20	1.76E+06 14	3.00E+06 24	3.99E+05 ND<25	1.39E+06 11	6.83E+05 11	0.00E+00 ND
Carbon Tetrachloride	6:97	1.47E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Benzene	7:17	9.26E+07	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
1,2-Dichloroethane	7:20	1.13E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Trichloroethene	7:66	1.23E+09	4.22E+06 17.1	3.40E+06 11.1	2.76E+07 224	4.32E+07 351	6.60E+06 268	2.24E+07 182	1.06E+07 173	0.00E+00 ND
Toluene	9:63	9.69E+07	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
1,1,2-Trichloroethane	10:19	1.14E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Tetrachloroethene	10:45	1.27E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	1.53E+05 ND<5	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
1,1,1,2-Tetrachloroethane	11:78	1.21E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
Ethylbenzene	11:79	9.32E+07	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
meta and para-Xylene	11:95	2.44E+08	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
ortho-Xylene	12:56	9.47E+07	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND
1,1,2,2-Tetrachloroethane	13:53	1.11E+09	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND	0.00E+00 ND

ND = not detected; analyte is below the reportable limit of quantitation for this sample
RT = retention time
ul = microliter
In. Hg = inches of mercury

Concentrations reported in micrograms per liter (ug/L)
ARF = average response factor
ml = milliliter

3/30/95

ANALYST : Raol Abraham

REVIEWED BY : David M. Pride

TABLE B–2
QUALITY ASSURANCE/QUALITY CONTROL REPORT
DAILY MID–POINT, BLANK ANALYSIS, AND LAST GC TEST RUN
MARCH 30, 1995

PID/ELCD #1

FILE: 127BQCMP.WK

		DAILY MID–POINT			BLANK	LAST GC TEST RUN		
STANDARD CONC. (ug/L)		5000	AVERAGE		AMBIENT AIR	5000	AVERAGE	
INJECTION VOLUME(uL)		1.00	RESPONSE	PERCENT	500	1.00	RESPONSE	PERCENT
COMPOUND/WEIGHT(ug)	RT	0.00500	FACTOR	DIFFERENCE		0.00500	FACTOR	DIFFERENCE
Dichlorodifluoromethane	2:85	0			0.00E+00	0		
RF		0.00E+00	2.76E+08	NA	ND	0.00E+00	2.76E+08	NA
Vinyl chloride	3:19	0			0.00E+00	0		
RF		0.00E+00	6.79E+08	NA	ND	0.00E+00	6.79E+08	NA
Chloroethane	3:51	0			0.00E+00	0		
RF		0.00E+00	1.22E+09	NA	ND	0.00E+00	1.22E+09	NA
Trichlorofluoromethane	3:71	0			0.00E+00	0		
RF		0.00E+00	1.51E+09	NA	ND	0.00E+00	1.51E+09	NA
1,1,2–Trichloro–trifluoroethane	4:33	0			0.00E+00	0		
RF		0.00E+00	1.62E+09	NA	ND	0.00E+00	1.62E+09	NA
1,1–Dichloroethene (PID)	4:31	181737			0.00E+00	153643		
RF		3.63E+07	3.53E+07	3	ND	3.07E+07	3.53E+07	–13
Methylene chloride	4:83	0			0.00E+00	0		
RF		0.00E+00	1.18E+09	NA	ND	0.00E+00	1.18E+09	NA
trans–1,2–Dichloroethene	5:12	5369389			0.00E+00	4499216		
RF		1.07E+09	1.02E+09	5	ND	9.00E+08	1.02E+09	–12
1,1–Dichloroethane	5:56	5420269			0.00E+00	4119696		
RF		1.08E+09	9.75E+08	11	ND	8.24E+08	9.75E+08	–15
Cis–1,2–Dichloroethene	6:17	5511706			0.00E+00	5323392		
RF		1.10E+09	1.19E+09	–7	ND	1.06E+09	1.19E+09	–11
Chloroform	6:51	0			0.00E+00	0		
RF		0.00E+00	1.33E+09	NA	ND	0.00E+00	1.33E+09	NA
1,1,1–Trichloroethane	6:77	6916237			0.00E+00	5178701		
RF		1.38E+09	1.23E+09	12	ND	1.04E+09	1.23E+09	–16
Carbon tetrachloride	6:97	0			0.00E+00	0		
RF		0.00E+00	1.47E+09	NA	ND	0.00E+00	1.47E+09	NA
Benzene (PID)	7:17	455586			0.00E+00	484220		
RF		9.11E+07	9.28E+07	–2	ND	9.68E+07	9.28E+07	4
1,2–Dichloroethane	7:20	6005267			0.00E+00	6436253		
RF		1.20E+09	1.13E+09	6	ND	1.29E+09	1.13E+09	14
Trichloroethene	7:96	6719008			0.00E+00	5386026		
RF		1.34E+09	1.23E+09	9	ND	1.08E+09	1.23E+09	–12
Toluene (PID)	9:63	435166			0.00E+00	518673		
RF		8.70E+07	9.69E+07	–10	ND	1.04E+08	9.69E+07	7
1,1,2–Trichloroethane	10:19	5144586			0.00E+00	5947946		
RF		1.03E+09	1.14E+09	–10	ND	1.19E+09	1.14E+09	4
Tetrachloroethene	10:45	7189712			0.00E+00	6958026		
RF		1.44E+09	1.27E+09	13	ND	1.39E+09	1.27E+09	10
1,1,1,2–Tetrachloroethane	11:78	0			0.00E+00	0		
RF		0.00E+00	1.21E+09	NA	ND	0.00E+00	1.21E+09	NA
Ethylbenzene (PID)	11:79	0			0.00E+00	0		
RF		0.00E+00	9.32E+07	NA	ND	0.00E+00	9.32E+07	NA
m,p–Xylene (PID)	11:95	1301018			0.00E+00	1181090		
RF		2.60E+08	2.44E+08	7	ND	2.36E+08	2.44E+08	–3
o–Xylene (PID)	12:56	517695			0.00E+00	477572		
RF		1.04E+08	9.47E+07	9	ND	9.55E+07	9.47E+07	1
1,1,2,2–Tetrachloroethane	13:53	0			0.00E+00	0		
RF		0.00E+00	1.11E+09	NA	ND	0.00E+00	1.11E+09	NA

3/30/95

ANALYST: Ragi Abraham

REVIEWED BY: David M. Pride

TABLE B-3
RESPONSE FACTORS FOR THREE POINT CALIBRATION
SUBJECT SITE, CALIFORNIA
MARCH 29, 1995

PID\ELCD #1
FILE: 03293PT.WK3

STANDARD CONC. (ug/L) INJECTION VOLUME(uL) COMPOUND/WEIGHT(ug)	RT	5000 0.50 0.0025	5000 1.00 0.0050	5000 2.00 0.0100	AVERAGE RESPONSE FACTOR	STANDARD DEVIATION	RELATIVE % STANDARD DEVIATION
Dichlorodifluoromethane	2:65	734023	1310163	2716429			
CF		2.94E+08	2.62E+08	2.72E+08	2.76E+08	1.62E+07	6
Vinyl chloride	3:19	1786097	3204856	6818979			
CF		7.14E+08	6.41E+08	6.82E+08	6.79E+08	3.68E+07	5
Chloroethane	3:51	3396896	5719594	11629352			
CF		1.36E+09	1.14E+09	1.16E+09	1.22E+09	1.19E+08	10
Trichlorofluoromethane	3:71	4032590	5080000	19020180			
CF		1.61E+09	1.02E+09	1.90E+09	1.51E+09	4.52E+08	30
1,1,2-Trichloro-trifluoroethane	4:33	3825426	7926176	17449728			
CF		1.53E+09	1.59E+09	1.74E+09	1.62E+09	1.12E+08	7
1,1-Dichloroethene (PID)	4:31	93303	160136	365886			
CF		3.73E+07	3.20E+07	3.66E+07	3.53E+07	2.67E+06	8
Methylene chloride	4:83	2778934	5712746	12932152			
CF		1.11E+09	1.14E+09	1.29E+09	1.18E+09	9.72E+07	8
trans-1,2-Dichloroethene	5:12	2354789	5055523	11122096			
CF		9.42E+08	1.01E+09	1.11E+09	1.02E+09	8.56E+07	8
1,1-Dichloroethane	5:56	2231126	4771018	10777280			
CF		8.92E+08	9.54E+08	1.08E+09	9.75E+08	9.43E+07	10
cis-1,2-Dichloroethene	6:17	2695078	5987786	13011752			
CF		1.08E+09	1.20E+09	1.30E+09	1.19E+09	1.12E+08	9
Chloroform	6:51	3023248	6846634	14077128			
CF		1.21E+09	1.37E+09	1.41E+09	1.33E+09	1.05E+08	8
1,1,1-Trichloroethane	6:77	2794762	6393482	13043840			
CF		1.12E+09	1.28E+09	1.30E+09	1.23E+09	1.01E+08	8
Carbon tetrachloride	6:97	3182720	7728544	15969240			
CF		1.27E+09	1.55E+09	1.60E+09	1.47E+09	1.74E+08	12
Benzene (PID)	7:17	214161	496140	935262			
CF		8.57E+07	9.92E+07	9.35E+07	9.28E+07	6.81E+06	7
1,2-Dichloroethane	7:20	2468078	5840650	12262736			
CF		9.87E+08	1.17E+09	1.23E+09	1.13E+09	1.25E+08	11
Trichloroethene	7:96	2682045	6369021	13334256			
CF		1.07E+09	1.27E+09	1.33E+09	1.23E+09	1.37E+08	11
Toluene (PID)	9:63	254961	508737	870290			
CF		1.02E+08	1.02E+08	8.70E+07	9.69E+07	8.57E+06	9
1,1,2-Trichloroethane	10:19	2538070	5868973	12299808			
CF		1.02E+09	1.18E+09	1.23E+09	1.14E+09	1.12E+08	10
Tetrachloroethene	10:45	2759336	6685968	13773024			
CF		1.10E+09	1.34E+09	1.38E+09	1.27E+09	1.46E+08	12
1,1,1,2-Tetrachloroethane	11:78	2753834	6260595	12843832			
CF		1.10E+09	1.25E+09	1.28E+09	1.21E+09	9.07E+07	8
Ethylbenzene (PID)	11:79	207451	477515	1010299			
CF		8.30E+07	9.55E+07	1.01E+08	9.32E+07	9.25E+06	10
m,p-Xylene (PID)	11:95	606614	1192899	2505170			
CF		2.43E+08	2.39E+08	2.51E+08	2.44E+08	6.07E+06	2
o-Xylene (PID)	12:56	216816	477561	1018668			
CF		8.67E+07	9.55E+07	1.02E+08	9.47E+07	7.60E+06	8
1,1,2,2-Tetrachloroethane	13:53	2596250	5707385	11569560			
CF		1.04E+09	1.14E+09	1.16E+09	1.11E+09	6.44E+07	6

RT = Retention Time
CF = Calibration Factor

ug/L = Micrograms per Liter
uL = Microliter
ug = Microgram

3/29/95

Analyst: Ragi Abraham

Reviewed by: David M. Pride

TABLE B-4
QUALITY ASSURANCE/QUALITY CONTROL REPORT
LAB CONTROL SAMPLE, BLANK ANALYSIS, AND LAST GC TEST RUN
MARCH 29, 1995

PID/ELCD #1

FILE: 0329QCLC.WK

		LAB CONTROL SAMPLE			BLANK	LAST GC TEST RUN		
STANDARD CONC. (ug/L) INJECTION VOLUME(uL) COMPOUND/WEIGHT(ug)	RT	5000 1.00 0.00500	AVERAGE RESPONSE FACTOR	PERCENT DIFFERENCE	AMBIENT AIR 500	5000 1.00 0.00500	AVERAGE RESPONSE FACTOR	PERCENT DIFFERENCE
Dichlorodifluoromethane	2:85	1198427			0.00E+00	0		
RF		2.40E+08	2.76E+08	-13	ND	0.00E+00	2.76E+08	NA
Vinyl chloride	3:19	3025470			0.00E+00	0		
RF		6.05E+08	6.79E+08	-11	ND	0.00E+00	6.79E+08	NA
Chloroethane	3:51	6401402			0.00E+00	0		
RF		1.28E+09	1.22E+09	5	ND	0.00E+00	1.22E+09	NA
Trichlorofluoromethane	3:71	7553504			0.00E+00	0		
RF		1.51E+09	1.51E+09	0	ND	0.00E+00	1.51E+09	NA
1,1,2-Trichloro-trifluoroethane	4:33	7526285			0.00E+00	0		
RF		1.51E+09	1.62E+09	-7	ND	0.00E+00	1.62E+09	NA
1,1-Dichloroethene (PID)	4:31	179739			0.00E+00	0		
RF		3.59E+07	3.53E+07	2	ND	0.00E+00	3.53E+07	NA
Methylene chloride	4:83	5604707			0.00E+00	0		
RF		1.12E+09	1.18E+09	-5	ND	0.00E+00	1.18E+09	NA
trans-1,2-Dichloroethene	5:12	4963453			0.00E+00	0		
RF		9.93E+08	1.02E+09	-3	ND	0.00E+00	1.02E+09	NA
1,1-Dichloroethane	5:56	4864896			0.00E+00	0		
RF		9.73E+08	9.75E+08	-0	ND	0.00E+00	9.75E+08	NA
Cis-1,2-Dichloroethene	6:17	6123002			0.00E+00	0		
RF		1.22E+09	1.19E+09	3	ND	0.00E+00	1.19E+09	NA
Chloroform	6:51	6679952			0.00E+00	0		
RF		1.34E+09	1.33E+09	0	ND	0.00E+00	1.33E+09	NA
1,1,1-Trichloroethane	6:77	5992784			0.00E+00	0		
RF		1.20E+09	1.23E+09	-3	ND	0.00E+00	1.23E+09	NA
Carbon tetrachloride	6:97	7229565			0.00E+00	0		
RF		1.45E+09	1.47E+09	-2	ND	0.00E+00	1.47E+09	NA
Benzene (PID)	7:17	438506			0.00E+00	0		
RF		8.77E+07	9.28E+07	-5	ND	0.00E+00	9.28E+07	NA
1,2-Dichloroethane	7:20	5670979			0.00E+00	0		
RF		1.13E+09	1.13E+09	0	ND	0.00E+00	1.13E+09	NA
Trichloroethene	7:96	6007731			0.00E+00	0		
RF		1.20E+09	1.23E+09	-2	ND	0.00E+00	1.23E+09	NA
Toluene (PID)	9:63	476242			0.00E+00	0		
RF		9.52E+07	9.69E+07	-2	ND	0.00E+00	9.69E+07	NA
1,1,2-Trichloroethane	10:19	5774256			0.00E+00	0		
RF		1.15E+09	1.14E+09	1	ND	0.00E+00	1.14E+09	NA
Tetrachloroethene	10:45	6180394			0.00E+00	0		
RF		1.24E+09	1.27E+09	-3	ND	0.00E+00	1.27E+09	NA
1,1,1,2-Tetrachloroethane	11:78	6280179			0.00E+00	0		
RF		1.26E+09	1.21E+09	4	ND	0.00E+00	1.21E+09	NA
Ethylbenzene (PID)	11:79	447365			0.00E+00	0		
RF		8.95E+07	9.32E+07	-4	ND	0.00E+00	9.32E+07	NA
m,p-Xylene (PID)	11:95	1147336			0.00E+00	0		
RF		2.29E+08	2.44E+08	-6	ND	0.00E+00	2.44E+08	NA
o-Xylene (PID)	12:56	451541			0.00E+00	0		
RF		9.03E+07	9.47E+07	-5	ND	0.00E+00	9.47E+07	NA
1,1,2,2-Tetrachloroethane	13:53	5874352			0.00E+00	0		
RF		1.17E+09	1.11E+09	6	ND	0.00E+00	1.11E+09	NA

3/29/95

ANALYST: Ragi Abraham

REVIEWED BY: David M. Pride

Table B–5
Environmental Support Technologies, Inc.
Detection Limits for Soil Gas Surveys

Detection Limits or Reportable Limits of Quantitation for Halogenated and Aromatic Hydrocarbons are 1 ug/L when the injection volume is 500 uL. For lesser injection volumes detection limits are listed below.

Injection Volume (uL)	Detection Limit (ug/L)
500	1.0
250	2.0
200	2.5
100	5.0
80	6.3
60	8.3
50	10.0
40	12.5
20	25.0
10	50.0
5	100.0
1	500.0

APPENDIX C

SOIL GAS SURVEYING METHODS AND PROCEDURES

ENVIRONMENTAL SUPPORT TECHNOLOGIES, INC.

SOIL GAS SURVEYING METHODS AND PROCEDURES FOR DRIVEN SOIL GAS PROBES

Environmental Support Technologies, Inc. (EST) will perform soil gas surveys in accordance with Los Angeles Regional Water Quality Control Board (LARWQCB) "Requirements for Active Soil Gas Investigation" dated March 8, 1994. Some procedures may be modified based on evaluation of project needs. Modifications to these procedures, if necessary, will be approved prior to implementation and will be described in the soil gas survey report.

DRIVEN SOIL GAS PROBE INSTALLATION

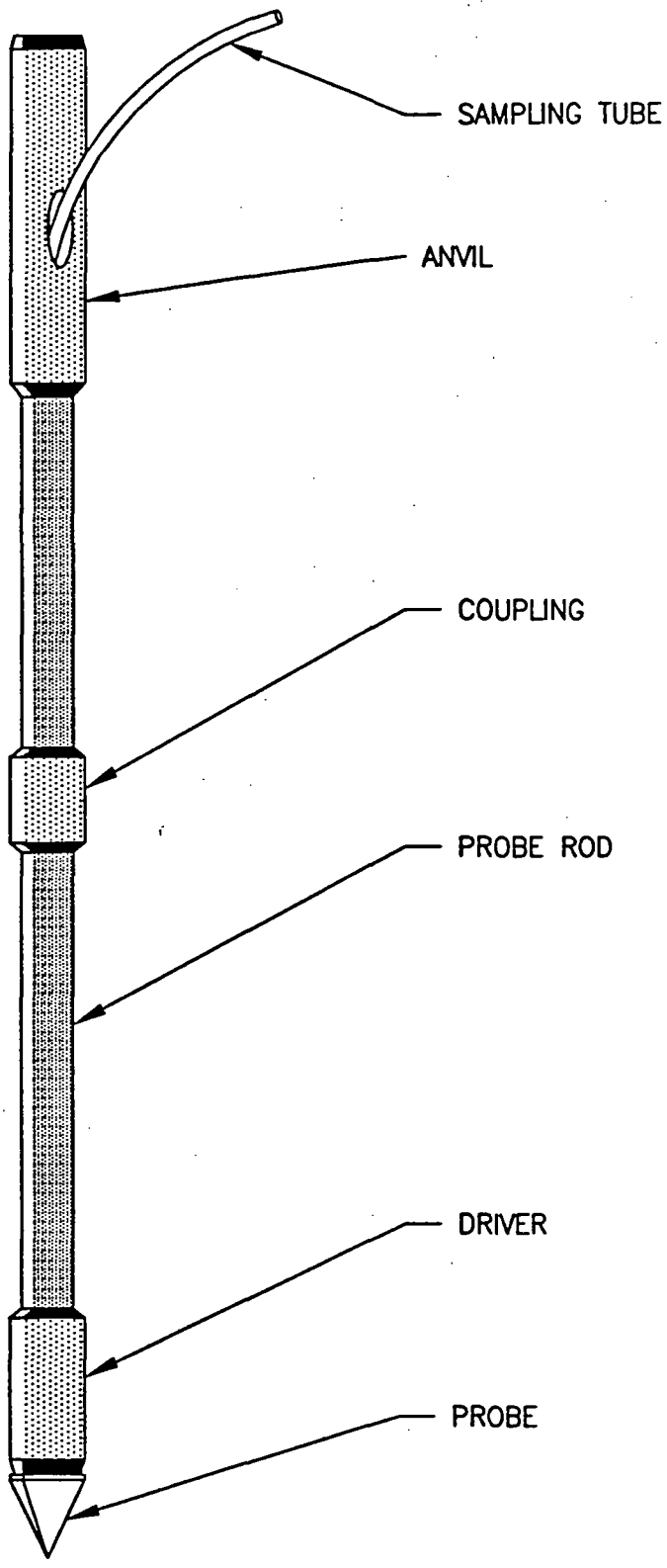
Soil gas sampling will be conducted using a horizontal grid system. Initially, probes will typically be installed to depths of approximately five feet below grade. Based on results of the shallow survey, probes will be installed to deeper depths using the same methods. A typical soil gas sampling probe is shown in Figure 1. Probes will be installed using either a percussion hammer or hydraulic ram. Once the probe has been installed to the desired depth, the probe shaft is withdrawn, leaving the probe point and sampling tube in the soil. A small amount of silica sand will be poured into the probe hole. The remaining open probe-hole will be back-filled with hydrated bentonite/cement grout to the ground surface. The probe point and sampling tube assembly will be left as a long-term soil gas monitoring point, unless otherwise specified prior to entering the field. This will allow subsequent soil gas sampling and analysis, if desired.

SOIL GAS SAMPLE COLLECTION AND HANDLING

Soil gas samples will be collected from the driven probes using the soil gas sampling system as shown in Figure 2. The soil gas sampling system is constructed of stainless-steel, glass, Nylaflow™, and Teflon™ components. Instrumentation associated with the sampling system includes a calibrated flow-meter and vacuum gage. Vacuum integrity of the sampling system will be tested prior to, and after the soil gas survey using leak-down testing methods.

Soil gas sampling probes will be purged at a flowrate of approximately 100 milliliters per minute (mL/min). Site-specific probe purging and sample volume calibrations will be initially performed to evaluate the appropriate volume of gas to be purged from each probe prior to sample collection. This will be done by performing time-series sampling of at least one probe to evaluate trends in soil gas concentrations as a function of purge volume.

After probe purging, soil gas samples will be withdrawn from the moving sample stream using a glass syringe fitted with a disposable needle and Mininert™ gas-tight valve. Soil gas samples will be analyzed by direct gas injection into a laboratory-grade, field-operable gas chromatograph (GC).



NOTE: NOT TO SCALE

FIGURE 1

TYPICAL DRIVEN SOIL GAS SAMPLING PROBE

ENVIRONMENTAL SUPPORT TECHNOLOGIES, INC.
SOIL GAS SAMPLING METHODS AND PROCEDURES

DRAWN BY: JST NOT TO SCALE DATE: 2-7-1995

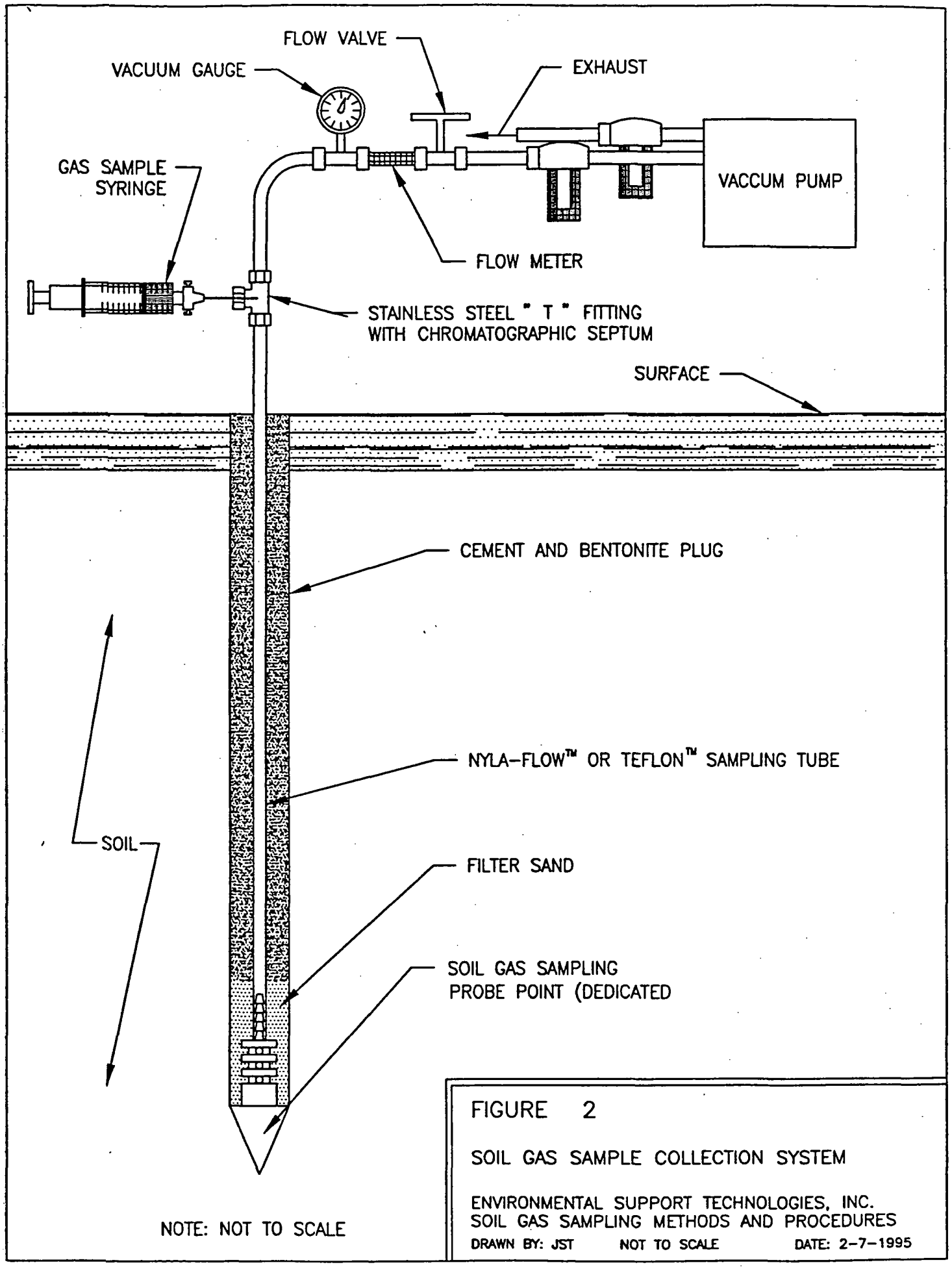


FIGURE 2

SOIL GAS SAMPLE COLLECTION SYSTEM

ENVIRONMENTAL SUPPORT TECHNOLOGIES, INC.
SOIL GAS SAMPLING METHODS AND PROCEDURES

DRAWN BY: JST NOT TO SCALE DATE: 2-7-1995

TABLE 1

SUMMARY OF
QUALITY ASSURANCE/QUALITY CONTROL ANALYSES
FOR SOIL GAS SURVEYS

CALIBRATION AND LABORATORY CONTROL SAMPLES		
DESCRIPTION	FREQUENCY	PRECISION GOAL %RSD or %DIFF
INITIAL THREE–POINT CALIBRATION (25 Target Compounds)	At the beginning of the soil gas survey, unless the RPDs of the initial laboratory check sample or daily mid–point calibration check samples exceed their goals.	20–30 (1)
INITIAL LABORATORY CONTROL SAMPLE (LCS) (25 Target Compounds)	At the beginning of the survey, following the initial three–point calibration.	15 (2)
DAILY MID–POINT CALIBRATION CHECK (12 Target Compounds)	At the beginning of each day.	15 (3) 25 (3)
LAST GC TEST RUN (12 Target Compounds)	At the end of each day.	20 (4)
FIELD CONTROL SAMPLES		
DESCRIPTION	FREQUENCY	PRECISION GOAL
BACKGROUND SAMPLE (5)	Minimum one per day.	N/A
SYRINGE BLANK (5)	Minimum one per day.	N/A

%RSD = Percent Relative Standard Deviation calculated based on the initial three–point calibration.
%DIFF = Percent Difference between the response factor obtained from the LCS, the daily mid–point calibration, or the last GC test run and the average response factor initially calculated based on the three–point calibration.
N/A = Not applicable.
(1) The %RSD goal for the initial three–point calibration will be 20 percent for all compounds except for Freon 11, Freon 12, Freon 113, chloroethane, and vinyl chloride for which the %RSD goal is 30 percent.
(2) The %DIFF goal for the LCS will be 15 percent for all target compounds.
(3) The %DIFF goal for the daily mid–point calibration check will be 15 percent for all compounds except for Freon 11, Freon 12, Freon 113, chloroethane, and vinyl chloride for which the %DIFF goal is 25 percent.
(4) The %DIFF goal for the last GC test run will be 20 percent for all compounds except for Freon 11, Freon 12, Freon 113, chloroethane, and vinyl chloride for which the %DIFF goal is 30 percent.
(5) A syringe/background sample will be analyzed using ambient air. If volatile organic compounds (VOCs) are not detected, the ambient air sample will represent the background sample and syringe blank. If VOCs are detected in the ambient air sample, a syringe blank will be analyzed using ultra–high–purity helium or nitrogen gas.

DAILY MID-POINT CALIBRATION CHECK

Daily field calibration of the GC will consist of a mid-point calibration analyses using the same standard as used for the initial multi-point calibration. The daily mid-point calibration check will include the 12 target compounds as specified in the previously referenced LARWQCB requirements. The RF of each compound (except for Freons 11, 12, and 113, chloroethane, and vinyl chloride) will be within 15 percent difference of the average RF from the initial calibration. The RF for the Freons 11, 12, and 113, chloroethane, and vinyl chloride will be within 25 percent difference of the initial calibration. If these criteria are not met, the GC will be re-calibrated. Daily calibration will be performed prior to the first sample analysis of the day. One-point calibration will be performed for all compounds detected at a particular site to ensure accurate quantitation. Subsequent calibration episodes, if deemed necessary, will consist of at least one injection of the standard exhibiting a similar detector response as that of samples encountered in the field.

BLANK INJECTIONS

The syringes used for soil gas sample collection will be filled with ambient air or high-purity carrier-grade gas from a compressed gas cylinder. The ambient air or high-purity gas will be injected directly into the GC. The blank injection will serve to detect contamination of the syringe to be used for sampling and verify the effectiveness of equipment decontamination procedures.

END OF DAY GC TEST RUN

A LCS will be analyzed at the end of each day. The LCS will contain the same compounds as the daily mid-point calibration standard (minimum 12 compounds). The LCS must be from a second source independent from the initial multi-point calibration standard. The RF for each compound will be within 20 percent difference of the average RF for the initial calibration. If this criteria is not met, additional LCS will be analyzed to satisfy this criteria.

DECONTAMINATION PROCEDURES

Probes and equipment in contact with the soil gas sample stream will be decontaminated prior to initiation of sampling. Decontamination of soil gas sampling equipment will be conducted by repeated washing and/or by baking in the gas chromatograph oven. Washing will include the use of a phosphate-free detergent wash, tap water rinse, organic-free water rinse, and followed by air drying.

SHORTENING THE GC RUN TIME

Shortening the GC run time is acceptable only if the chemist feels that doing so will not sacrifice the quality of data obtained and doing so meets the approval of appropriate client and agency personnel.

SAMPLE ANALYSIS

Soil gas samples will be analyzed in the field using a field-operable gas chromatograph equipped with a photo-ionization detector (PID) and an electrolytic conductivity detector (ELCD). The PID and ELCD (if used) will be used in-series to analyze for target compounds as specified in the LARWQCB requirements (March 1994) including halogenated and aromatic hydrocarbons. Detection limits for the LARWQCB target compounds will be no more than one microgram per liter (μg/L) of gas except when a compound concentration exceeds the initial calibration range. When sample dilution (or smaller injection volume) is required to maintain analytes within the calibration range, this results in raised detection limits for the analysis.

Soil gas samples may be analyzed for other constituents on a site-specific basis. Other common analyses methods include total volatile hydrocarbons (TVHs) as gasoline, mineral spirits, or jet fuel, and selected ketones. A series of quality assurance/quality control (QA/QC) analyses will be performed prior to, during, and following the analysis of soil gas samples. A summary of these QA/QC analyses is shown in Table 1 and each are described below.

INITIAL MULTI-POINT EQUIPMENT CALIBRATION

The chromatographic equipment used for soil gas analyses will be calibrated using high-purity solvent-based standards obtained from certified vendors or using gas standards prepared in the field (for TVHs). Standards are typically prepared in high-purity methanol or dodecane solvent. Typically, calibration using solvent-based standards will be performed using varying injection volumes of the stock solvent-based standard without dilution. If necessary, stock solvent-based standards will be diluted to an appropriate concentration. Standards prepared by dilution will be prepared by introducing a known volume of stock solvent-based standard into a known volume of high-purity solvent.

Initial calibration will be performed for the LARWQCB-specified 25 target compounds. The gas chromatograph will be calibrated using three standard injections to establish a three-point calibration curve. The lowest standard will not be higher than five times the Method Detection Limit (or 5 μg/L). The percent relative standard deviation (%RSD) of the response factor (RF) for each target compound will not exceed 20 percent except for trichlorofluoromethane (Freon 11), dichlorodifluoro-methane (Freon 12), trichlorotrifluoromethane (Freon 113), chloroethane, and vinyl chloride which will not exceed 30 %RSD. Identification and quantitation of compounds in the field will be based on calibration under the same analytical conditions as for three-point calibration.

LABORATORY CONTROL SAMPLE (LCS)

A laboratory control sample (LCS) from a second source independent from the initial calibration standard will be used to verify the true concentration of the initial calibration standard. The LCS will include the LARWQCB target compounds and the RF for each compound will be within +/- 15 percent difference from the initial calibration.

COMPOUND CONFIRMATION

As a means of compound confirmation, EST will collect one soil gas sample in a Tedlar™ bag for off-site analysis by a certified laboratory using gas chromatography/mass spectrometric (GC/MS) methods.

REPORTING OF SAMPLE RESULTS AND QA/QC INFORMATION

Reporting of sample results and QA/QC information will be performed in accordance with the Los Angeles Regional Water Quality Control Board's "QA/QC and Reporting Requirement for Soil Gas Investigation" dated March 8, 1994.